Title: Math Carnival

Link to Outcomes:

- **Problem Solving** Students will demonstrate the ability to solve problems using mathematical reasoning within a cooperative team setting.
- **Communication** Students will read, discuss, and write mathematics**.**
- **Reasoning** Students will make conjectures, gather information, and discuss outcomes.
- **Measurement** Students will demonstrate and apply customary measurement strategies.
- **Computation & Estimation** Students will demonstrate the ability to estimate reasonable solutions to problems prior to computation.
- **Geometry & Spatial Sense** Students will demonstrate the ability to apply geometric relationships by building a three dimensional object.

Brief Overview:

This unit deals with the development and implementation of student-created math games to be used in a math carnival at the end of the school year. Students will also apply geometry skills by drawing a scale map.

Grade/Level:

Grades 5 & 6

Duration/Length:

The lessons included should require three to four 45-minute class periods. However, using the extension activities would greatly increase the time frame needed.

Prerequisite Knowledge:

- Basic problem-solving skills
- Customary measurement
- Use of math tools (compass, ruler, protractor)
- Calculation of area and perimeter
- Drawing to scale
- Division of whole numbers

Objectives:

The students will:

- discuss their ideas for a math carnival game within a group.
- use problem solving skills to create a game within a cooperative group.
- use reasoning skills to modify their game.
- create and decorate an aesthetically- pleasing game, using customary measurement and appropriate math tools for accuracy.
- estimate area of two sites (total carnival and individual game).
- calculate area of two sites (total carnival and individual game).
- use the aforementioned sites to organize a scale map of the carnival that best utilizes available space.

Materials/Resources/Printed Materials:

For day 1:

- 2 or 3 Velcro balls
- One large bull's eye with numbers
- Pencil and paper for each student

For day 2:

- Miscellaneous materials to make a carnival game, such as balls, baskets, velcro darts, dice, small bean bags, colorful paper, etc.
- Poster paper (for game rules)
- Markers, crayons, glitter, paint, as necessary

For day 3:

- Rulers or yardsticks
- Large graph paper (1-inch blocks, enough for each group)
- Manipulatives to help construct scale map (ex.: separated Unifix cubes)
- Pencils
- Markers, crayons, or colored pencils

Development/Procedures:

Day 1:

- Model a typical carnival game such as throwing a Velcro ball at a bull's eye. Incorporate mathematical rules such as giving a sum, then the player must hit addends that equal that sum.

- Arrange students in groups of 3 or 4 for entire learning unit.

- Instruct students that they are to invent a carnival game that incorporates elementary mathematics. Assign a written paragraph describing their game and its rules. Direct students to bring game materials from home to their next class.

Day 2:

- Tell students that they are responsible for building and decorating the games to grab the interest of potential players. Advise students to use appropriate math tools for accuracy and also to post game rules.

- Have students play the games to determine if modifications are needed. Adjust as necessary, and write a paragraph explaining the reasons. Add this writing to the previous day's work.

Day 3:

- Decide where to have the carnival and plan adequate space for each game (Ex.: three square desks). Instruct students to estimate, then calculate, total carnival area and individual game area.

- Using these areas and given manipulatives, students will make a scale drawing of the carnival set-up and explain in writing how it was done.

Evaluation:

Day 1:

Students write a paragraph that explains the rules and mathematical concepts and examples for their game. The paragraph can be assigned point values for using complete sentences, complete ideas, mathematically sound concepts and appropriate examples of problems.

Day 2:

Students add to Day One's paper. Evaluator checks for appropriate modifications, explanations, and complete sentences, using a "check" or "check plus" system.

Instructor will visually evaluate the proper use of math tools evident in the construction and decoration of an aesthetically-pleasing carnival game.

Day 3:

Evaluate the scale map keeping in mind the following requirements:

- Including all areas for individual games
- Keeping site boundaries
- Allowing adequate walkways
- Using a correct scale
- Including a key

Students write a paragraph that explains how the scale map was drawn. The paragraph can be assigned point values for using complete sentences, complete ideas and mathematically sound concepts.

Extension/Follow Up:

If time allows, the instructor may hold a Math Carnival after including some of the following lessons. Students may:

- estimate prizes needed or food and drink required and fill out an order form.
- establish and post carnival management rules.
- create a survey sheet for carnival patrons and graph results.
- schedule carnival visits for other classes, keeping in mind time management
- design and build a game booth.

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